APS Inverter

Any Power Solution Series

Inverter & Charger & AVR

Functional Specification

Table of Contents:

Document History..... 2
Table of Contents.....3
Figures of Unit.....3
Line mode specification.....5
Inverte mode specification.....6
Charge mode specification.....9
Other.....11
Appendix.....12

Figures of Unit:

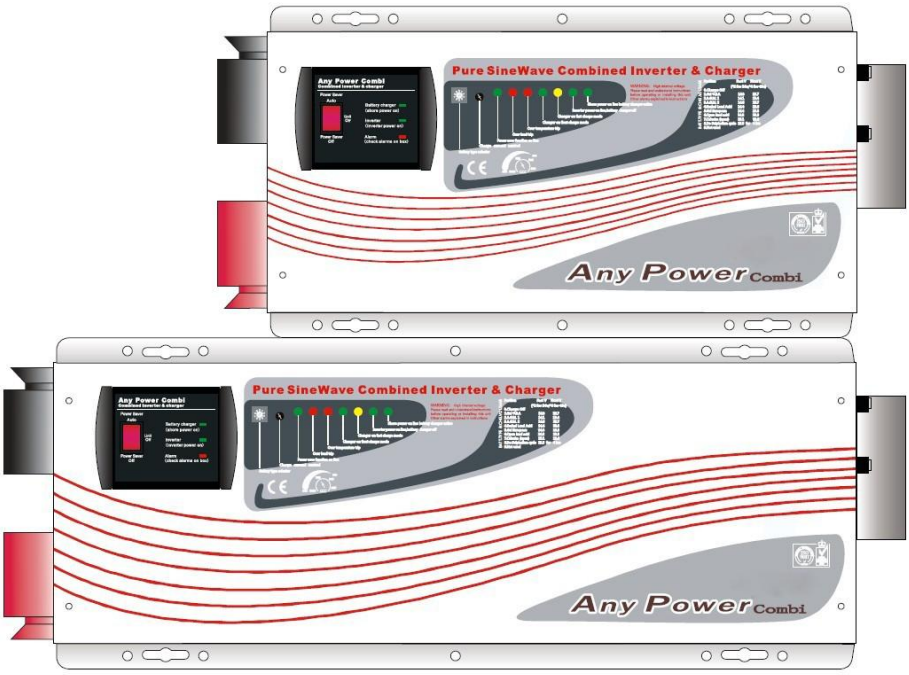


Figure1 Top View

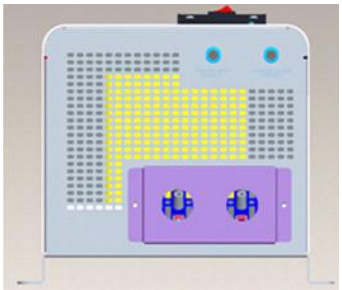


Figure2 DC Side View ***Figure3 AC Side View***

Combi INV & CHG & AVR Function 3 in 1 .

Mode & size:

APS 1.0KW-1.5KW : 382mm*218mm*179mm;

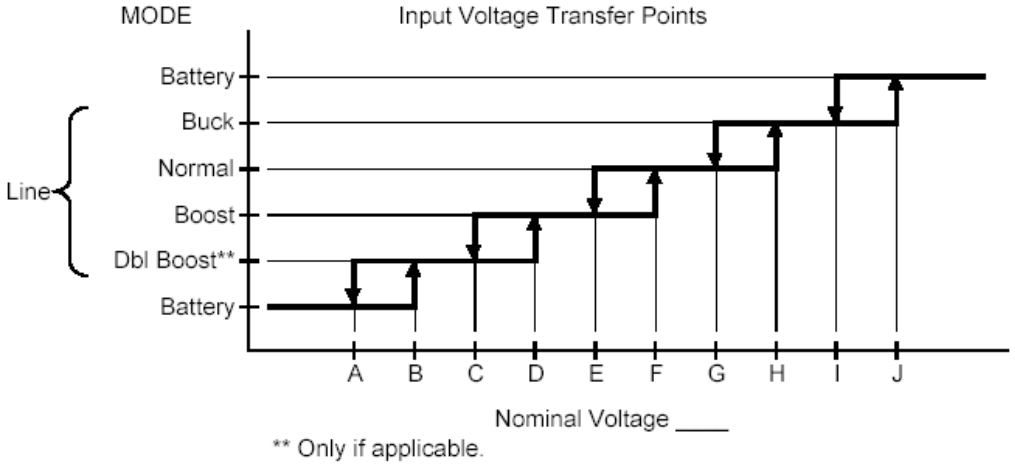
APS 2.0KW-3.0KW : 442mm*218mm*179mm;

APS 4.0KW-6.0KW : 598mm*218mm*179mm;

MODEL **(Any Power Solution Series)**	**12VDC Series**	**24VDC Series**	**48VDC Series**
	1.0~3.0KW	**1.0~6.0KW**	**1.0~6.0KW**

Line Mode Specifications:

Input Voltage Waveform	Sinusoidal (Utility or Generator)					
Any-Power Solution AVR Function	LV (NA/JPN)			HV (INTL)		
Acceptable Input Voltage Range (Vac)	0-160			0-300		
Nominal Input Voltages (±4% Vac)	**100**	**110**	**120**	**220**	**230**	**240**
(A) Line Low loss N/W (On Battery)	75/65	84/72	92/78	168/143	176/150	183/156
(B) Line Low comeback N/W (On Boost)	80/70	89/77	97/83	178/153	186/160	193/166
(C) Line 2nd boost threshold (On Boost)	**	**	**	**	**	**
(D) Line 2nd boost comeback (On Boost)	**	**	**	**	**	**
(E) Line 1st boost threshold (On Boost)	90	99	108	198	207	216
(F) Line 1st boost comeback (On Normal)	93	103	112	205	215	225
(G) Line buck comeback (On Normal)	106	118	128	235	246	256
(H) Line buck threshold (On Buck)	110	121	132	242	253	264
(I) Line high comeback (On Buck)	115	127	139	253	266	278
(J) Line high loss (On Battery)	120	132	144	263	276	288



Remark：Detail Line low loss setting refers Appendix 1

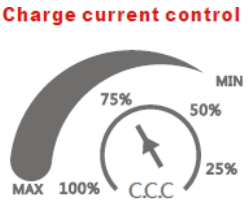
Nominal Input Frequency	50Hz / 60Hz (Auto detection)
Low Line Frequency Re-connect	58±0.3Hz for 60Hz; 48±0.3Hz for 50Hz;
Low Line Frequency Disconnect	57±0.3Hz for 60Hz; 47±0.3Hz for 50Hz;
High Line Frequency Re-connect	64±0.3Hz for 60Hz; 54±0.3Hz for 50Hz;

High Line Frequency Disconnect	65±0.3Hz for 60Hz; 55±0.3Hz for 50Hz;
Output Voltage Waveform	As same as Input Waveform
Over-Load Protection (SMPS load)	Circuit breaker
Output Short Circuit Protection	Circuit breaker
Efficiency (Line Mode)	>95%
Transfer Switch Rating	30Amp for UL & TUV 40Amp for UL
Transfer Time (Ac to Dc)	10ms Max
Transfer Time (Dc to Ac)	10ms Max
Pass through without Battery	Yes (Optional)
Max Bypass Overload Current	40Amp

Invert Mode Specifications:

MODEL POWER TYPE	**Any Power Solution Series**					
	APS 1012 ~ 6048					
Output Voltage Waveform	Pure Sine Wave					
Rated Output Power (VA/W)	1.0K	2.0K	3.0K	4.0K	5.0K	6.0K
Power Factor	0~1.0					
Nominal Output Voltage (V)	100-110-120Vac			220-230-240Vac		
Nominal Output Frequency (Hz)	60Hz			50Hz		
(Default)	Auto Tracking Main Frequency (First Connection)					
Output Voltage Regulation	±10% RMS					
Nominal Efficiency	>88%					
Over-Load Protection (SMPS Load)	(110%<load<125%) ±10%: Fault (shutdown output) after 15 Mins; (125%<load<150%) ±10%: Fault (shutdown output) after 60s; (Load>150%) ±10%: Fault (shutdown output) after 20s；					
Surge Rating (10s)	3.0	6.0	9.0	12.0	15.0	18.0
Capable of Starting Electric Motor	1HP	2HP	3HP	4HP	5HP	6HP
Output Short Circuit Protection	Current Limit Function (Fault after 1sec)					
Bypass Breaker Size	10A	20A	30A	30A	40A	40A
Nominal DC Input Voltage	12.0Vdc		24.0Vdc		48.0Vdc	
Min DC Start Voltage	10.0	10.5	20.0	21.0	40.0	42.0
Low Battery Alarm	10.5	11.0	21.0	22.0	42.0	44.0
Low DC Input Shut-Down	10.0	10.5	20.0	21.0	40.0	42.0
Remark：Detail Battery Voltage setting refers Appendix 1						
Low DC Input Auto- Restart	13.0Vdc		26.0Vdc		52.0Vdc	
High DC Input Alarm & Fault	16.0Vdc		32.0Vdc		64.0Vdc	
High DC Input Recovery	15.5Vdc		31.0Vdc		62.0Vdc	
Power Saver Function *Remark：* *Detail P/S setting refers Appendix 1.*	Load ≦25W (Enabled On “P/S AUTO” Setting of Remote Control)					

Charge Mode Specifications:

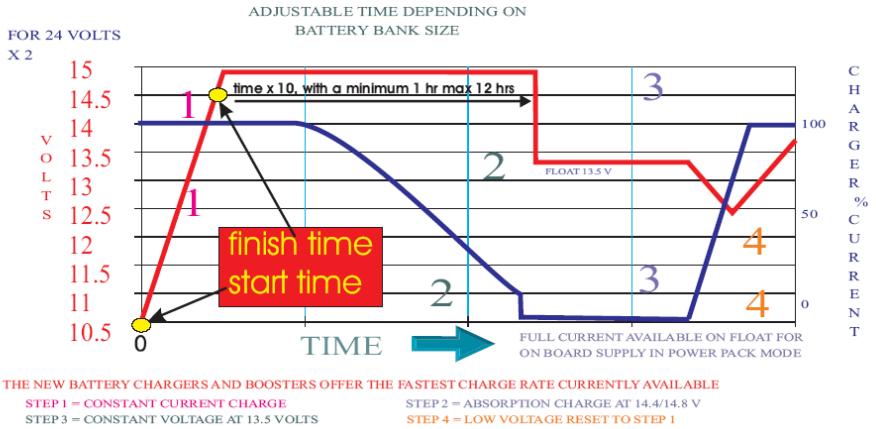
MODEL Battery Type	**12VDC Series**	**24VDC Series**	**48VDC Series**
(Any Power Solution Series)	**1.0~3.0KW**	**1.0~6.0KW**	**1.0~6.0KW**
Nominal Input Voltage	100-110-120Vac		220-230-240Vac
Input Voltage Range	B ~ I		B ~ I
Nominal Output Voltage	According to Battery Type		
Nominal Charge Current (Amp)	35 70 90	20 35 45 70 80 90	10 20 30 40 50 60
Charge Current Controller **Charge Current Regulation**			
Battery Initial Voltage	0 ~ 15.7 Vdc Can Operate Without Battery（Optional）		
Charger Short Circuit Protection	Circuit Breaker		
Breaker Size	10/20/30Amp		
Over Charge Protection	Bat. V ≥15.7Vdc Beeps 0.5s every 1s & fault after 60s		

Charge Algorithm

Algorithm	***Three stage:*** →***Boost CC*** (Constant Current Stage) → ***Boost CV*** (Constant Voltage Stage) → ***Float*** (Constant Voltage Stage)

Charge Stage Transition Definitions

- ***Boost CC Stage***: If A/C input is applied, the charger will run at full current in CC mode until the charger reaches the boost voltage.
- Software timer will measure the time from A/C start until the battery charger reaches 0.3V below the boost voltage, then take this time as T_0 and $T_0 \times 10 = T_1$.
- ***Boost CV Stage:*** Start a T_1 timer; the charger will keep the boost voltage in Boost CV mode until the T_1 timer has run out. Then drop the voltage down to the float voltage. The timer has a minimum time of 1 hour and a maximum time of 12 hours.
- ***Float Stage:*** In float mode, the voltage will stay at the float voltage.
- If the A/C is reconnected or the battery voltage drops below 12Vdc/24Vdc, the charger will reset the cycle above.
- **If the charge maintains the float state for 10 days, the charger will reset the cycle.**



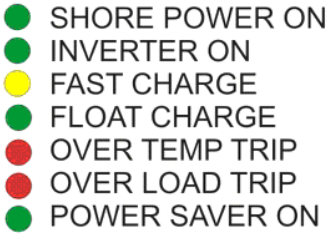
Battery Type Setting

BATTERY TYPE SELECTOR

Switch setting	Description	Boost / Vdc	Float / Vdc
		12Vdc Mode (*2 for 24Vdc ; *4 for 48Vdc)	
0	Charger Off	-	
1	Gel USA	14.0	13.7
2	AGM 1	14.1	13.4
3	AGM 2	14.6	13.7
4	Sealed lead acid	14.4	13.6
5	Gel EURO	14.4	13.8
6	Open lead acid	14.8	13.3
7	Calcium	15.1	13.6
8	De sulphation	15.5 (4 Hours then Off)	
9	Not used	-	-

Other:

Indicator



SHORE POWER ON	GREEN LED lighting on AC Mode
INVERTER ON	GREEN LED lighting on Inverter Mode
FAST CHARGE	YELLOW LED lighting on Fast Charging Mode
FLOAT CHARGE	GREEN LED lighting on Float Charging Mode
OVER TEMP TRIP	RED LED lighting on Over Temperature
OVER LOAD TRIP	RED LED lighting on Over Load
POWER SAVER ON	GREEN LED lighting on Power Saver Mode (Power Saver Load ≦25W)

Remark：Detail indicator setting refers Appendix 2.

Remote Control

LED	**Battery Charger (Shore power on)**	GREEN LED Lighting On Battery Charger Mode
	Inverter (Inverter power on)	GREEN LED Lighting On Inverter Mode
	Alarm (Check alarms on box)	RED LED Lighting On Alarm
Switch	**Power Saver Auto**	Power On With Saver Mode (Power Saver ≦25W)
	Unit Off	Power Totally Off
	Power Saver Off	Power On Without Saver Mode

Remark: Detail Remote control solution refers Appendix 3.

Audible Alarm

Battery Voltage Low	Inverter green LED Lighting, and the buzzer beep 0.5s every 5s.
Battery Voltage High	Inverter green LED Lighting, and the buzzer beep 0.5s every 1s, and Fault after 60s.
Invert Mode Over-Load	(1)110%< load<125%, No audible alarm in 14 minutes, Beeps 0.5s every 1s in 15th minute and Fault after 15 minutes; (2)125% <load<150%, Beeps 0.5s every 1s and Fault after 60s; (3)Load>150%, Beeps 0.5s every 1s and Fault after 20s;
Over Temperature	Heat sink temp. ≥105ºC, Over temp red LED Lighting, beeps 0.5s every 1s;

Remark：Detail Alarm setting refers Appendix 2.

Protection

Over Temp. Protection	Heat sink temp. ≥105ºC, Fault (shutdown Output) after 30 seconds
Back-Feed Protection	Yes
Fault Recovery	By Restart The INV.

FAN Operation

<table>
<tr><td>Fan Operation</td><td>Variable speed fan operation is required in invert and charge mode. This is to be implemented in such a way as to ensure high reliability and safe unit and component operating temperatures in an operating ambient temperature up to 50°C.

Speed to be controlled in a smooth manner as a function of internal temperature and/or current.
Fan should not start/stop suddenly.
Fan should run at minimum speed needed to cool unit.
Fan noise level target <60db.

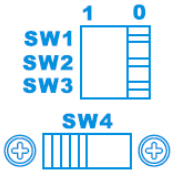
The Fan Logic as Below:
<table>
<tr><th>Condition</th><th>Enter Condition</th><th>Leave condition</th><th>Speed</th></tr>
<tr><td rowspan="2">HEAT SINK TEMPERATURE</td><td>T < 85 ℃</td><td>T ≥ 85℃</td><td>50%</td></tr>
<tr><td>T ≥ 85℃</td><td>T < 80℃</td><td>100%</td></tr>
<tr><td rowspan="2">CHARGER CURRENT</td><td>I ≤ 50%Max</td><td>I > 50%Max</td><td>50%</td></tr>
<tr><td>I > 50%Max</td><td>I ≤ 40%Max</td><td>100%</td></tr>
<tr><td rowspan="2">LOAD% (INV MODE)</td><td>Load < 50%</td><td>Load ≥ 50%</td><td>50%</td></tr>
<tr><td>Load ≥ 50%</td><td>Load ≤ 40%</td><td>100%</td></tr>
</table></td></tr>
</table>

General Specifications	
Safety Certification	CE (EN62040-1)
EMC Classification	EN62040-2, C2
Operating Temperature Range	0°C to 40°C
Storage temperature	-15ºC ～ 60ºC
Operation humidity	5% to 95%
Audible Noise	60dB max
Cooling	Forced Air, Variable Speed Fan
Size	*APS 1.0KW-1.5KW : 382mm*218mm*179mm;* *APS 2.0KW-3.0KW : 442mm*218mm*179mm;* *APS 4.0KW-6.0KW : 598mm*218mm*179mm;*

Appendix:

1.DIP Switch function:

DIP Switch No.	Function Setting	ON	OFF
SW1	Batt Low S.D Point	10.5Vdc	10.0Vdc
SW2	I/P V Range	154~253Vac	184~253Vac
SW3	Power Saver timer	Detect load Per 3Secs	Detect load Per 30Secs
SW4 (Option)	Mode Selection: Battery Power - Main Power	Battery Mode Priority	Utility Mode Priority



2. Indicator and Buzzer setting.

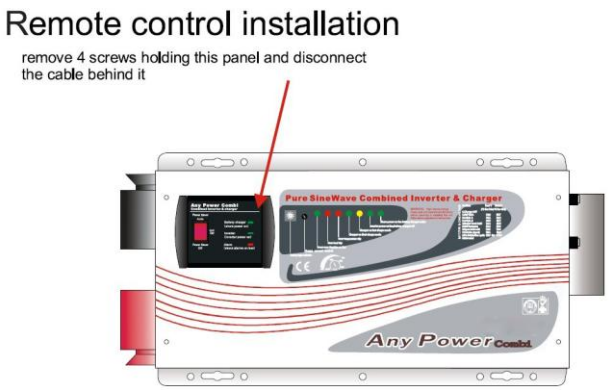
Status	Item	Indicator On Top Cover							LED On Remote Control			Buzzer
		SHORE POWER ON	INV ON	FAST CHG	FLOAT CHG	OVER TEMP TRIP	OVER LOAD TRIP	POWER SAVER ON	BATT CHG	INVERTER	Alarm	
Line Mode	CC	√	×	√	×	×	×	×	√	×	×	×
	CV	√	×	√, blink	×	×	×	×	√	×	×	×
	Float	√	×	×	√	×	×	×	√	×	×	×
	Standby	√	×	×	×	×	×	×	×	×	×	×
Invert Mode	Inverter On	×	√	×	×	×	×	×	×	√	×	×
	Power Saver	×	×	×	×	×	×	√	×	×	×	×
Alarm Mode	Battery Low	×	√	×	×	×	×	×	×	√	√	Beep 0.5s every 5s
	Battery High	×	√	×	×	×	×	×	×	√	√	Beep 0.5s every 1s

	Overload On Invert Mode	×	√	×	×	×	√	×	×	√	√	Refer to "Audible alarm"
	Over-Temp On Invert Mode	×	√	×	×	√	×	×	×	√	√	Beep 0.5s every 1s
	Over-Temp On Line Mode	√	×	√	×	√	×	×	√	×	√	Beep 0.5s every 1s
	Over Charge	√	×	√	×	×	×	×	√	×	√	Beep 0.5s every 1s
Fault Mode	Fan Lock	×	×	×	×	×	×	×	×	×	×	Beep continuous
	Battery High	×	√	×	×	×	×	×	×	√	×	Beep continuous
	Inverter Mode Overload	×	×	×	×	×	√	×	×	×	×	Beep continuous
	Output Short	×	×	×	×	×	√	×	×	×	√	Beep continuous
	Over-Temp	×	×	×	×	√	×	×	×	×	×	Beep continuous
	Over Charge	×	×	√	×	×	×	×	√	×	×	Beep continuous
	Back Feed Short	×	×	×	×	×	×	×	×	×	×	Beep continuous

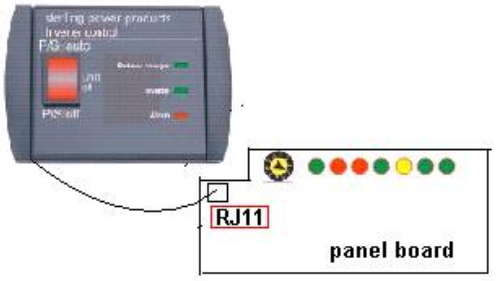
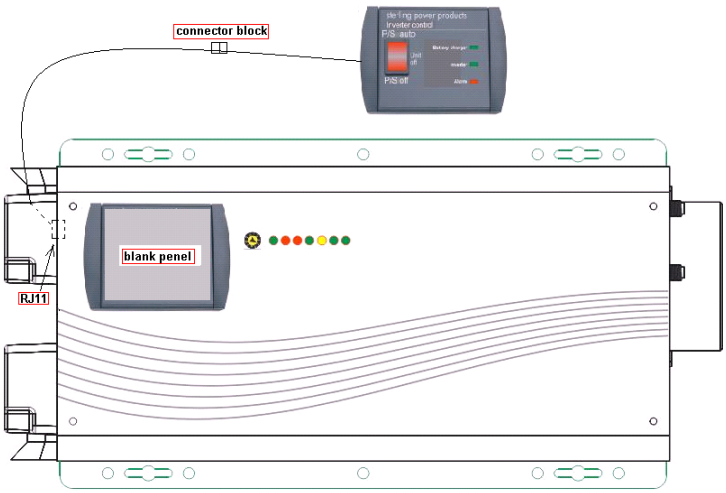
Remark: √ shows the indicator on. × shows the indicator off. √, blink shows the indicator blinking about 0.5s on and 0.5s off.

3. Remote control solution:

1). Figure of the Chassis (when the remote panel located in top cover):



2). Connect to the RJ11 that in the panel board by a short cable when the Remote control located in the chassis.



3). When you remove the control panel, use a Blank panel to cover the hole and a long cable through the RJ11 connect to the chassis.